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Appendix 4.3.1. Lake Michigan Resuspension Field Data Set (One of the Two Attachments in Nathan Hawley's E-Mail on February 2, 2001)

Station	Deployed	Retrieved	Latitude	Longitude	Depth	Wave Height	Comments
Musk WI	01.11.1994	24.05.1995	43 12.30'N	86 20.83'W	13	0.7	
M24	01.11.1994	24.05.1995	43 13.75'N	86 25.46'W	28	1	
M27	01.11.1994	25.05.1995	43 09.50'N	85 25.87'W	58	3.1	
M19	01.11.1994	24.05.1995	42 02.93'N	86 38.57'W	100	>4.5	No resuspension
Musk WI	25.05.1995	12.07.1995	43 12.30'N	86 20.83'W	13	1	
Musk WI	12.07.1995	21.08.1995	43 12.30'N	86 20.83'W	13	>1.5	No resuspension
M24	12.07.1995	21.08.1995	43 13.75'N	86 25.46'W	28	">1,5"	No resuspension
M27	12.07.1995	21.08.1995	43 09.50'N	86 25.87'W	58	>1.5	No resuspension
M19	12.07.1995	21.08.1995	43 02.93'N	86 38.57'W	100	>1.6	No resuspension
Musk WI	31.08.1995	17.11.1995	43 12.30'N	86 20.83'W	13	0.8	
M24	31.08.1995	17.11.1995	43 13.75'N	86 25.46'W	28	1.7	
M27	31.08.1995	12.10.1995	43 09.50'N	86 25.87'W	58	>1.7	No resuspension
M19	31.08.1995	12.10.1995	43 02.93'N	86 38.57'W	100	>3.3	No resuspension
Lesht1	02.04.1998	30.04.1998	42 39.90'N	87 44.89'W	15	1.5	
Lesht2	23.07.1998	24.08.1998	42 52.22'N	87 42.41'W	25	>1.7	No resuspension
Lesht3	28.10.1998	01.12.1998	42 52.18'N	87 42.41'W	25	2.6	
MWI	24.07.1998	13.08.1998	43 12.32'N	86 20.44'W	14	>1.4	No resuspension
M24	24.07.1998	13.08.1998	43 11.33'N	86 22.76'W	30	>1.4	No resuspension
M27	24.07.1998	13.08.1998	43 10.04'N	86 25.87'W	60	>1.4	No resuspension
W1	15.10.1998	11.11.1999	42 08.09'N	86 29.50'W	10	1	
W2	15.10.1998	20.04.1999	41 44.14'N	86 54.45'W	10	0.8	
W3	27.10.1998	10.05.1999	42 57.50'N	87 48.79'W	16	2	
S Haven	15.10.1999	17.11.1999	42 24.23'N	86 19.68'W	18	1.4	
MO4	03.03.2000	22.05.2000	41 55.58'N	86 39.92'W	20	1.1	
MO9	03.03.2000	22.05.2000	42 14.87'N	86 24.74'W	18	1	
M11	03.03.2000	22.05.2000	42 17.36'N	86 30.60'W	38	2	
MWI	07.04.2000	29.05.2000	43 12.21'N	86 21.00'W	15	1	
MWI	13.09.2000	30.10.2000	43 12.23'N	86 21.32'W	17	1.6	
M25	13.09.2000	30.10.2000	43 12.24'N	86 22.90'W	26	2	
M55	13.09.2000	27.11.2000	43 12.73'N	86 28.65'W	55	2.7	

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Appendix 4.3.2. Notes (One of the Two Attachments in Nathan Hawley's E-Mail on February 2, 2001) From Nathan Hawley on the Data Set in Appendix 4.3.1

Dear Xiaomi:

As you requested, I am attaching the spreadsheet with the critical wave heights required for resuspension. These were determined for the thirty deployments by plotting the sediment concentration near the bed against the wave heights from the GLERL wave model. This method was used by Barry and I in our paper analyzing a data set from 1981 (Lesht and Hawley, 1987, Journal of Great Lakes Research, v. 13, 375-386, see fig 6 for an example). In the present case this method assumes that a) high sediment concentrations are caused only by local resuspension, and b) that local resuspension is caused mainly by wave action. If both these assumptions are true then high sediment concentrations will occur only when the wave height exceeds a certain value. For the thirty deployments listed in the spreadsheet, these assumptions appear to hold in about 1/3 of the cases. In another 1/3 of the cases no resuspension occurred at all, in these cases the maximum waves during the deployment can be used as a lower bound for the critical height (the height required for resuspension must exceed the height listed). These deployments were either at a very large depth (M19, 100m) or occurred during the stratified period. In the remaining cases there was no clear critical wave height but resuspension did occur. In these cases, I determined the wave height by visually examining the time series observations of concentration and wave height and then estimating the critical height as best I could. In most cases the results aren't totally consistent (there are instances where waves larger than the critical height do not correlate with increased sediment concentrations), but I did the best I could.

We might do a bit better if we used the combined (waves plus currents) bottom stress as the forcing parameter, but this depends upon the wave period as well, and the wave model doesn't do a real good job of calculating the wave period.

If you look at the data carefully, there are indications that for similar water depths larger waves are required to resuspend sediment on the western side of the lake than on the eastern side. There is also some indication that the sediment properties at a given location vary somewhat throughout the year, but I don't think that there is enough data to say anything more. I did a rough plot of the data and fitted a straight line by eye. My line suggests that a wave height of about 4.8 m would be required to resuspend sediment at 100m.